

## ATMOSPHERIC ELECTRICITY.

## AURORAS.

The following reports of auroral displays during August, 1885, have been received:

Fort Totten, Dakota: the auroral display of the evening of July 31 ended at 2.10 a. m., August 1st.

Manistique, Michigan, 1st: an aurora was observed from 9 to 11 p. m.

Bismarck, Dakota, 1st: an aurora was observed at 11.05 p. m., covering 85° of the northern horizon and extending to an altitude of 30°; the display ended at 11.50 p. m.

Fort Meade, Dakota, 1st: from 11 to 11.30 p. m. an auroral light was observed in the north, extending to an altitude of 3°.

Duluth, Minnesota, 1st: a very faint aurora was visible from 9.15 p. m. until after midnight; the display consisted of an occasional beam, or several beams, in the northern sky.

Marquette, Michigan, 1st: an aurora was observed at 10 p. m.; it consisted of an arch covering 20° of the northern horizon and extending to an altitude of 6° or 8°; streamers from the western part of the arch were also observed; the display ended at 11.40 p. m.

Eastport, Maine, 2d: a very faint auroral arch was observed from 8.10 to 9.30 p. m.; streamers extended to an altitude of 20°.

Auroral displays were also noted on the 2d at Gardiner and Orono, Maine, and Burlington, Vermont.

Saint Vincent, Minnesota, 4th: an aurora was observed from 11.20 p. m. until 3 a. m. of the 5th, when it was obscured by fog; the display extended over 40° of the horizon and consisted of a pale, whitish light, with occasional streamers.

Portland, Maine, 6th: an aurora was observed from 9.40 p. m. until 12.50 a. m. of the 7th. It first appeared as a low arch covering about 80° of the horizon; a period of maximum brilliancy occurred at about 10.10 p. m., when a few streamers, scarcely perceptible, were observed. A second period of brilliancy occurred at 12.15 a. m. of the 7th, at which time the arch was much higher and more irregular in form; brilliant streamers also appeared, having a quite rapid motion from west to east.

Mount Washington, New Hampshire, 6th: a faint auroral light was observed from 9.35 p. m. until daylight of the 7th; streamers covered 90° of the horizon and extended to an altitude of 45°.

Gardiner, Maine, 6th: an aurora appeared at 9 p. m.; at 11 p. m. beams were visible; at 1.30 a. m. on the 7th the beams had disappeared, but the light remained.

The following stations also report the aurora of the 6th: Bangor and Orono, Maine; Cambridge, Massachusetts; Burlington and Newport, Vermont.

Mount Washington, New Hampshire, 7th: an aurora appeared at 9.27 p. m. and continued until the morning of the 8th; the display, though somewhat more extensive, resembled that observed on the previous evening.

Eastport, Maine, 7th: an auroral arch of about 15° altitude was observed from 9 p. m. until midnight.

Gardiner, Maine, 7th: a faint auroral display was visible from 8.30 p. m. until 1.30 a. m. of the 8th.

The display of the 7th was also observed at Bangor, Maine, and Newport, Vermont.

Mount Washington, 8th: a faint auroral light was visible soon after sunset; it continued until early morning of the 9th. This display was also seen at Newport, Vermont.

Vevay, Switzerland county, Indiana, 9th: a diffuse, crimson aurora, of moderate brilliancy, was observed at 3 a. m.; at 4 a. m. the display was somewhat brighter; during the appearance of the aurora, numerous meteors were seen.

Eastport, Maine, 11th: an auroral arch was observed from 7.30 to 8.45 p. m.; occasional streamers of pale, yellow color appeared at intervals, extending to an altitude of 30°. An aurora was also observed on the evening of the 11th, at Buckfield, Maine.

Yates Centre, Woodson county, Kansas, 12th: an aurora was observed at 8.30 p. m.; it consisted of bright bands in the east, extending to the "milky way" and inclining somewhat to the southward; at 9 p. m. an arch formed at an altitude of 40°. An auroral display was also observed on the 12th at Harvard, Nebraska.

Erie, Pennsylvania, 13th: an aurora was observed from 8.50 to 10.30 p. m., being most brilliant at 9.45; at times the lake was plainly seen by the light of the aurora.

Garrettsville, Ohio, 14th.

Gardiner, Maine, 15th: a brilliant aurora was visible at 1 a. m.; at 2.45 beams were observed.

New Haven, Connecticut, 16th: four auroral streamers, partly obscured by clouds, were observed in the northern sky at 3.20 a. m.

Erie, Pennsylvania, 18th: an aurora was observed at 8.20 p. m., covering 40° of the horizon and extending to an altitude of 15° or 20°; the display continued until 9.25 p. m.; it was not marked by any unusual features.

Astoria, Oregon, 26th: aurora was reported on this date by local newspapers, but was not seen by the observer.

Eastport, Maine, 27th: an auroral arch was observed from 7.30 to 11 p. m.

Fort Totten, Dakota, 28th: an aurora was observed from 10.50 p. m. until daylight of the 29th; the light extended to an altitude of 30°.

Eastport, Maine, 29th: an auroral arch was observed from 7 to 11 p. m.

Gardiner, Maine, 29th: at 8 p. m. bright aurora, with beams; the display ended at 9 p. m. An aurora was also observed on the 29th at Orono, Maine.

Burlington, Vermont, 31st.

## THUNDER-STORMS.

Thunder-storms were reported in the various states and territories as follows:

*Alabama*.—1st, 2d, 4th, 5th, 8th to 14th, 16th, 19th, 21st, 26th.

*Arizona*.—1st to 19th, 21st, 22d, 29th, 30th.

*Arkansas*.—1st, 5th, 9th to 13th, 19th, 21st, 22d, 25th, 29th.

*California*.—3d, 4th, 5th, 13th to 18th.

*Colorado*.—1st, 3d, 4th, 6th, 8th, 10th to 13th, 15th, 18th, 20th to 26th, 28th, 29th, 31st.

*Connecticut*.—1st, 4th, 5th, 11th, 13th, 18th, 19th, 20th, 22d to 25th.

*Dakota*.—1st to 7th, 9th to 12th, 15th to 20th, 23d, 28th.

*Delaware*.—12th, 13th, 22d, 25th.

*District of Columbia*.—1st, 2d, 3d, 13th, 14th, 19th, 22d, 23d, 25th, 30th.

*Florida*.—1st to 22d, 24th, 29th, 31st.

*Georgia*.—1st, 2d, 7th to 10th, 12th, 13th, 14th, 17th, 18th, 21st, 23d to 26th, 29th, 30th, 31st.

*Idaho*.—18th, 21st.

*Illinois*.—1st to 9th, 11th, 12th, 18th, 19th, 21st to 25th, 27th.

*Indiana*.—1st to 9th, 12th, 13th, 21st to 25th.

*Indian Territory*.—3d to 6th, 8th, 9th, 10th.

*Iowa*.—1st to 8th, 11th, 12th, 16th to 24th, 30th.

*Kansas*.—1st to 16th, 18th, 20th to 25th, 28th to 31st.

*Kentucky*.—1st, 2d, 4th, 7th, 12th, 16th, 20th, 22d, 23d, 24th.

*Louisiana*.—1st, 2d, 4th, 9th to 14th, 19th to 23d, 25th, 26th.

*Maine*.—1st, 4th, 5th, 11th, 13th, 14th, 17th, 18th, 19th, 21st, 22d.

*Maryland*.—1st, 2d, 3d, 9th, 12th, 13th, 22d, 24th, 25th, 31st.

*Massachusetts*.—1st to 5th, 8th, 11th, 12th, 13th, 17th, 18th, 19th, 22d, 24th, 31st.

*Michigan*.—1st, 3d, 4th, 6th, 8th, 9th, 12th, 13th, 17th, 18th, 21st, 22d, 23d, 29th, 31st.

*Minnesota*.—2d, 3d, 5th, 7th to 12th, 15th, 16th, 17th, 20th, 29th.

*Mississippi*.—11th, 25th.

*Missouri*.—1st, 2d, 10th, 11th, 12th, 19th, 21st, 22d, 24th, 25th, 29th.

**Montana.**—3d to 7th, 10th, 14th, 22d, 23d, 26th, 27th.  
**Nebraska.**—1st, 3d to 8th, 11th, 14th, 16th, 18th, 22d, 23d, 24th, 26th, 27th, 28th, 30th, 31st.  
**Nevada.**—4th, 14th to 18th, 20th.  
**New Hampshire.**—1st, 5th, 12th, 13th, 21st, 22d.  
**New Jersey.**—1st to 5th, 7th, 11th, 12th, 13th, 15th, 17th, 18th, 19th, 21st to 26th, 30th.  
**New Mexico.**—1st, 2d, 5th, 9th, 10th, 11th, 25th, 27th, 28th, 30th, 31st.  
**New York.**—1st to 5th, 8th to 14th, 17th to 22d, 24th, 25th, 27th, 29th, 30th, 31st.  
**North Carolina.**—1st to 11th, 13th, 14th, 24th, 25th, 28th, 31st.  
**Ohio.**—1st to 10th, 12th, 13th, 16th, 18th to 25th, 30th, 31st.  
**Oregon.**—Albany, 20th.  
**Pennsylvania.**—1st to 5th, 9th, 12th, 13th, 17th to 25th, 30th, 31st.  
**Rhode Island.**—1st, 2d, 5th, 13th, 15th, 19th, 24th, 25th.  
**South Carolina.**—1st, 2d, 8th, 13th, 14th, 16th, 17th, 19th, 22d, 24th, 25th, 28th.  
**Tennessee.**—1st to 4th, 6th, 14th, 16th, 17th, 21st, 24th, 25th, 30th.  
**Texas.**—1st, 2d, 3d, 7th to 23d, 25th to 31st.  
**Utah.**—4th to 7th, 9th, 10th, 12th, 17th, 19th to 28th, 31st.  
**Vermont.**—1st, 4th, 11th, 12th, 13th, 17th to 22d, 26th to 29th, 31st.  
**Virginia.**—1st, 2d, 3d, 5th, 7th, 10th, 12th, 13th, 19th, 22d to 26th, 30th.  
**Washington Territory.**—18th, 19th, 22d.  
**West Virginia.**—3d, 4th, 7th, 11th, 12th, 13th, 17th, 22d, 24th, 25th.  
**Wisconsin.**—1st to 4th, 6th to 9th, 12th, 16th, 17th, 18th, 20th, 21st, 23d, 24th, 30th.  
**Wyoming.**—1st, 3d, 5th, 8th, 11th.

## ELECTRICAL PHENOMENA.

The observer on the summit of Mount Washington, New Hampshire, reports that during a light shower of rain, which began at 11.20 p. m. on the 12th, the anemometer cups were surrounded by a halo of electric light.

The observer on the summit of Pike's Peak, Colorado, reports that during a thunder-storm on the afternoon of the 29th the atmosphere was charged with electricity to an unusual degree, and that during a fall of sleet and hail, from 7.46 to 8.20, a buzzing noise, resembling that made by bees, came from all pointed objects.

## OPTICAL PHENOMENA.

## SOLAR HALOS.

Solar halos were observed in the various states and territories as follows:

**Arkansas.**—Lead Hill, 10th, 16th, 22d, 26th, 29th.  
**California.**—San Diego, 1st, 2d; San Francisco, 19th.  
**Dakota.**—5th, 7th, 16th, 23d to 26th, 31st.  
**Florida.**—Key West, 10th, 15th.  
**Georgia.**—Atlanta, 12th.  
**Illinois.**—Riley, 11th, 20th; Swanwick, 19th, 23d.  
**Iowa.**—1st, 4th, 5th, 12th, 13th, 14th, 17th, 20th, 25th, 26th.  
**Kansas.**—Wyandotte, 18th, 19th.  
**Maine.**—Cornish, 3d, 21st.  
**Michigan.**—2d, 3d, 7th, 8th, 11th, 20th, 22d, 27th, 31st.  
**Missouri.**—Lamar, 9th; Saint Louis, 23d.  
**Nebraska.**—Harvard, 14th, 18th; Fairbury, 18th; Tecumseh, 28th.  
**Nevada.**—Carson City, 19th, 21st.  
**New Hampshire.**—Mount Washington, 12th.  
**New York.**—17th, 20th, 21st, 27th, 29th.  
**Ohio.**—6th, 8th, 9th, 12th, 18th, 20th, 29th.  
**Pennsylvania.**—Wellsborough, 19th; Pittsburg, 28th.  
**Tennessee.**—Nashville, 6th, 16th, 22d, 28th, 30th.  
**Texas.**—Fort Concho, 18th, 19th, 20th; Galveston, 20th; Indianola, 27th.  
**Virginia.**—Dale Enterprise, 13th, 27th, 30th.  
**Wyoming.**—Fort Bridger, 21st.

## LUNAR HALOS.

Lunar halos were observed in the various states and territories as follows:

**Alabama.**—Mobile, 19th to 22d.  
**Arizona.**—Wickenburg, 17th; Prescott, 16th.  
**California.**—San Diego, 23d.  
**Colorado.**—Montrose, 19th.  
**Dakota.**—Bismarck and Webster, 25th.  
**Florida.**—13th, 17th to 22d, 24th to 27th, 29th.  
**Georgia.**—Atlanta, 19th.  
**Illinois.**—Springfield, 23d; Riley, 26th.  
**Indiana.**—Logansport, 23d; Vevay, 19th.  
**Iowa.**—Davenport, 27th; Burlington, 29th.  
**Kansas.**—14th, 18th, 21st, 25th.  
**Louisiana.**—New Orleans, 20th.  
**Maryland.**—Baltimore, 21st, 24th.  
**Massachusetts.**—Milton and Readville, 29th.  
**Michigan.**—19th, 20th, 23d, 24th, 26th.  
**Missouri.**—Saint Louis, 24th.  
**Nebraska.**—De Soto, 16th; Harvard, 19th.  
**New Hampshire.**—Mount Washington, 27th.  
**New York.**—Buffalo, 22d; Le Roy, 23d.  
**Ohio.**—Toledo, 1st; Cleveland, 19th; Napoleon, 22d; Cincinnati, 23d.  
**Pennsylvania.**—Wellsborough, 12th, 18th, 24th; Pittsburg, 26th.  
**South Carolina.**—Spartanburg, 19th; Stateburg, 19th, 21st.  
**Tennessee.**—16th, 21st, 22d, 24th, 28th, 29th, 30th.  
**Texas.**—16th to 22d, 26th, 27th.  
**Utah.**—Frisco, 21st.  
**Virginia.**—7th, 13th, 16th, 18th, 22d, 23d, 27th, 28th.  
**Wyoming.**—Fort Bridger, 21st, 23d, 26th.

The phases of the moon during August were: last quarter, 3d, 4.50 p. m.; new moon, 10th, 7.08 a. m.; first quarter, 17th, 8.41 a. m.; full moon, 25th, 12.19 p. m.; perigee, 9th, 5.18 a. m.; apogee, 21st, 12.54 p. m.

## MIRAGE.

Mirage was observed at the following stations during the month:

Salina, Kansas, 16th.  
 Maud, Kansas, 22d, 23d.  
 Reidsville, North Carolina, 10th.  
 Indianola, Texas, 28th.

## MISCELLANEOUS PHENOMENA.

## SUN SPOTS.

Prof. David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for August, 1885:

Date— August, 1885.	No. of new.		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
4, 5 p. m.	1	1	.....	.....	1	1	3	25†	
6, 6 p. m.	0	3†	0	0	.....	.....	3	30†	
8, 5 p. m.	4	40†	.....	.....	.....	.....	7	70†	
9, 5 p. m.	1	23†	0	0	1	3	6	90†	
11, 3 p. m.	0	0	.....	.....	0	0	4	80†	
14, 3 p. m.	.....	.....	.....	.....	.....	.....	5	55†	
15, 6 p. m.	0	0	0	5†	0	0	5	50†	
16, 4 p. m.	0	0	0	5†	0	0	5	35†	
17, 4 p. m.	0	0	1	5†	0	0	4	20†	
20, 7 a. m.	0	0	0	0	0	0	4	20†	
22, 4 p. m.	1	2	.....	.....	1	2	3	15†	
29, 11 a. m.	.....	.....	.....	.....	.....	.....	3	40†	
27, 12 m.	0	0	0	0	0	0	3	45†	
28, 12 m.	2	7	0	0	1	5	5	55†	
30, 3 p. m.	0	20†	.....	.....	.....	.....	4	75†	
31, 9 a. m.	1	20†	1	5†	0	0	4	90†	

Faculae were seen at the time of every observation.

† Approximated.

## SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-five stations show 5,025 observations to have been made, of which four were reported doubtful; of the re-